

AMSAT News Service Weekly Bulletins

Issue: ANS-150

Date: 2016-05-29

Sources: amsat-ans-2016-ans-150-weekly-hyperkitty-5eabfb5fad.txt

AMSAT NEWS SERVICE

ANS-150

The AMSAT News Service bulletins are a free, weekly news and information service of AMSAT North America, The Radio Amateur Satellite Corporation. ANS publishes news related to Amateur Radio in Space including reports on the activities of a worldwide group of Amateur Radio operators who share an active interest in designing, building, launching and communicating through analog and digital Amateur Radio satellites.

The news feed on <http://www.amsat.org> publishes news of Amateur Radio in Space as soon as our volunteers can post it.

Please send any amateur satellite news or reports to:
ans-editor at amsat.org.

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ANS-150 AMSAT News Service Weekly Bulletins

AMSAT News Service Bulletin 150.01

>From AMSAT HQ KENSINGTON, MD.

DATE May 29, 2016

To All RADIO AMATEURS

BID: \$ANS-150.01

Fox-1Cliff and Fox-1D Launch No Earlier Than July 28, 2016

This week AMSAT Vice-President Engineering, Jerry Buxton, N0JY, announced at the Dayton Hamvention AMSAT Forum on Saturday that the launch for Fox-1Cliff and Fox-1D is now NET (No Earlier Than) July 28, 2016.

Fox-1Cliff and Fox-1D will be integrated onto the Spaceflight Sherpa platform for its maiden flight aboard a SpaceX Falcon 9 launch from

Vandenberg Air Force Base.

<http://www.amsat.org/?p=5219>

Not a member of AMSAT yet?

You're invited to join on-line at:

<http://store.amsat.org/catalog/index.php?cPath=32>

Please consider making a donation to support the Fox-1 series of cubesats using the links on the front page
<http://www.amsat.org>.

[ANS thanks AMSAT Vice-President Engineering, Jerry Buxton, N0JY, for the above information]

2016 AMSAT-NA Board of Directors Nominations Notice

It's time to submit nominations for the upcoming AMSAT-NA Board of Directors election. Three director's terms expire this year: Tom Clark, K3IO, JoAnne Maenpaa, K9JKM, and Lou McFadin, W5DID. In addition, up to two Alternates may be elected for one year terms.

A valid nomination requires either one Member Society or five current individual members in good standing to nominate an AMSAT-NA member for Director. Written nominations, consisting of the nominee's name and call, and the nominating individual's names, calls and individual signatures should be mailed to: AMSAT-NA, 10605 Concord St, #304 Kensington, MD 20895-2526.

In addition to traditional submissions of written nominations, which is the preferred method, the intent to nominate someone may be made by electronic means. These include e-mail, Fax, or electronic image of a petition. Electronic petitions should be sent to MARTHA at AMSAT.ORG or Faxed to (301)822-4371.

No matter what means is used, petitions MUST arrive no later than June 15th at the AMSAT-NA office. If the nomination is a traditional written nomination, no other action is required. If it is other than this, i.e. electronic, a verifying traditional written petition MUST be received at the AMSAT-NA office at the above address within 7 days following the close of nominations on June 15th.

ELECTRONIC SUBMISSIONS WITHOUT THIS SECOND, WRITTEN VERIFICATION ARE NOT VALID UNDER THE EXISTING AMSAT-NA BYLAWS.

[ANS thanks AMSAT-NA Secretary, Paul Stoetzer, N8HM, for the above information]

AMSAT's Bob Carpenter W30TC Inducted into CQ Hall of Fame

Bob Carpenter, W30TC, a longtime devoted AMSAT volunteer became a Silent Key Friday, January 8th. Bill Tynan, W3X0, wrote a memorial item in ANS-024

<http://amsat.org/pipermail/ans/2016/000893.html>

AMSAT has received the news that Bob has been inducted into the CQ Hall of Fame.

CQ ANNOUNCES 2016 HALL OF FAME INDUCTEES (Press Release, Date May 20th):

CQ magazine today announced its 2016 Hall of Fame inductees, including only the second non-amateurs elected to the CQ DX Hall of Fame, two new inductees to the CQ Contest Hall of Fame and 21 new members of the CQ Amateur Radio Hall of Fame.

The CQ Amateur Radio Hall of Fame honors those individuals, whether licensed hams or not, who have made significant contributions to amateur radio; and those amateurs who have made significant contributions either to amateur radio, to their professional careers or to some other aspect of life on our planet. The 2016 inductees (listed alphabetically) are:

Bob Arnold, N2JEU (SK) - Co-developer (with Keith Lamonica, W7DXX, see below) of the first internet-controlled remote base

Grant Bingeman, KM5RG (SK) - Developed "method of moments" antenna modeling software for AM broadcast stations and 160-meter amateur antennas

Bob Carpenter, W30TC (SK) - Pioneer of meteor scatter and FM stereo broadcast technology; longtime AMSAT volunteer

David Dary, W5ZAX - Journalist, author, journalism educator - former correspondent for CBS and NBC News, journalism professor at University of Kansas and University of Oklahoma, author of over 20 books on the American West

Matt Ettus, N2MJI - Software defined radio pioneer; developed first Universal Software Radio Peripheral (USRP) with GNU radio software support

Terry Fox, WB4FJI - Packet radio pioneer; primary developer of AX.25 amateur packet protocol

Elmer "Bud" Frohardt, Jr., W9DY (SK) -- The original "Elmer" for whom ham radio mentors are named (courtesy of a 1971 QST "How's DX?" column by Rod Newkirk, W9BRD/VA3ZBB)

Fred Gissoni, K4JLX (SK) - Adaptive technology pioneer; co-developer of the Porta-Braille and Pocket-Braille note-taking devices for the visually impaired, as well as many other devices

Ken Kellerman, K2A0E - Radioastronomer; pioneer of radio interferometry; co-developer of very long baseline interferometry (VLBI), which permits multiple telescopes to function as a single instrument

Keith Lamonica, W7DXX - Co-developer (with the late Bob Arnold, N2JEU) of the first internet-controlled remote base

George Mitchell, K6ZE (SK) - Member of the Tuskegee Airmen in World War II and 2007 recipient of the Congressional Gold Medal for his wartime service

Les Mitchell, G3BHK (SK) - Founder of Jamboree on the Air (JOTA), annual event to introduce amateur radio to scouts and guides around the world

William Moerner, WN6I - Co-recipient of the 2014 Nobel Prize in chemistry for his work in high-resolution microscopy

Leigh Orf, KG4ULP - Co-developer of tornado simulator using computer modeling to simulate conditions under which tornadoes form

Joe Rudi, NK7U - Former Major League baseball player; 3-time All-Star

Wes Schum, W9DYV (SK) - Co-founder of Central Electronics, developed first commercially-manufactured amateur radio SSB transmitter

Garry Shandling, ex-KQ6KA/KD60Y (SK) - Well-known comedian, actor, writer and television personality

Mason Southwirth, ex-W1VLH (SK) - Head of ARRL International Geophysical Year (IGY) Propagation Research Project in 1958-59; conducted additional propagation research at Stanford University

- Boris Stepanov, RU3AX (ex-UW3AX) - Leading Russian amateur, deputy editor of Russian Radio magazine; pioneer of computerized contest logging and log-checking; developed prototype for World Radiosport Team Championships (WRTC); first to propose "glass cockpit" for ham transceiver, combining frequency readout and spectrum scope on front panel display
- Rufus Turner, W3LF (SK) - Believed to be the first African-American radio amateur in the U.S.; helped develop 1N34A diode; wrote 1949 article in Radio-Electronics magazine on how to "Build a Transistor"
- Perry Williams, W1UED (SK) - Longtime ARRL Washington Coordinator and League archivist; convinced Congress to approve vanity call-sign program and not to impose a license application fee on amateurs; persuaded FCC to retain large amateur microwave allocations and to create primary amateur allocation at 2.4 GHz

[ANS thanks CQ Magazine for the above information]

AMSAT Demonstration Station at the Dayton Hamvention Recap

This was my first year running the AMSAT demonstration station at the Dayton Hamvention after Keith Pugh, W5IU, had run it for many years. After volunteering at the demo station the past couple of years, I knew what to expect: a poor horizon to the north (due to the arena), high levels of RF (including lids running FM simplex inside the satellite subband on 2m), and lots of fun demoing satellite operation to curious newcomers as well as meeting many satellite operators I've worked on the satellites in person.

The core of the demo station was similar to past years. I brought my pair of Yaesu FT-817s (known fondly among many satellite operators as a Yaesu FT-1634) as well as a Windows 10 tablet and a FUNcube Dongle Pro+. The antenna was an Arrow II 146/437-10BP and I also brought a cheap Optera camera tripod. In addition, John Papay, K8YSE, brought his Icom IC-910H, laptop, and Arrow antenna on a speaker stand with a mount that allowed a smooth way to change polarity throughout the pass. With this mix of equipment, we were able to demonstrate several methods of satellite operating: computer controlled Doppler tuning of a transceiver designed for satellite operating, manual Doppler tuning with a pair of VHF/UHF all-mode transceivers, and use of an SDR receiver with a VHF/UHF all-mode receiver for full-duplex operating on linear transponders.

The demo area was up and running by the time the outdoor areas of the Hamvention opened at 8:00am on Friday morning. Our first pass was an XW-2A pass at 8:17am, with K8YSE operating his IC-910H and KD8CA0 running the antenna. The demos were generally a two man operation with one operator at the radio and one serving as the antenna rotor. After this pass, we listened to the 70cm PSK31 signal from N0-84 and a few packet bursts from the ISS using the FUNcube Dongle Pro+ and Windows 10 tablet before a pair of A0-85 passes and an XW-2F pass operated by K8YSE.

By special request, the A0-73 transponder was activated a day area and was available for Friday morning's demos. I operated the 10:51am pass with my pair of Yaesu FT-817s. A video of this pass is available on the AMSAT North America Facebook page:
<https://www.facebook.com/groups/7828379515/permalink/10154235785829516/>

Later, I operated an S0-50 and F0-29 pass with that pair of FT-817s as well, but had to fight strong desense. After those two passes, I grabbed a diplexer I had brought and placed it on the 2m transmit side (to filter out the third harmonic from the transmitter) and experienced no further desense problems with my setup. PY5LF captured part of the S0-50 pass on video:

<https://www.youtube.com/watch?v=wVPb1a9NqxQ>

K8YSE then operated the rest of the F0-29, A0-7, and S0-50 passes that afternoon.

On Saturday morning, we opened with listening (and decoding a bit) to the PSK31 beacon on N0-84. Unfortunately, we did not have HF transmit capability. The signal from N0-84's PSK31 transponder is very good and I highly recommend anyone who can transmit on 10m at 25-50 watts and receive a 70cm FM signal give it a try.

After working an XW-2F pass with the pair of FT-817s, I decided to give the SDR receiver a try and made one QSO each on XW-2C and XW-2A using the SDR as a downlink receiver. This was the first time I had tried doing this and it was fun, though I definitely need some more practice with it! I also tried the SDR receiver on A0-73 and F0-29 and made a couple of QSOs.

Shortly after the ARRL Youth Forum ended around noon, a large crowd began to arrive at the demo area. Nine-year old Hope Lea, KM4IPF, who had given a talk at the Youth Forum operated a pass of S0-50 around 12:19pm and made many QSOs from coast-to-coast. A video of this pass is available from the AMSAT North America Facebook page:

<https://www.facebook.com/james.g.lea/videos/10154297928734363/>

After the S0-50 pass, we made several QSOs on F0-29 and then listened to the SPROUT digitalker. The SPROUT digitalker is generally active on Saturday passes. A video of this pass is available here:

<https://www.youtube.com/watch?v=4FRNZkMb5yM>

K8YSE then operated the Saturday afternoon passes of F0-29, A0-7, and A0-85 with his Icom IC-910H setup. Highlights included several of us passing around the microphone to work Paulo, PV8DX, in Brazil.

We got an early start on Sunday morning, operating a pass of A0-85 to the northeast using my dual FT-817 setup just prior to 8:00am. Although I was the only person in the demo area, I made three QSOs on A0-85, holding the antenna myself and leaning over the table to operate the radio. After this, I operated a pass of XW-2F around 8:30am. For the 8:44am XW-2A pass, ARRL Media & Public Relations Manager Sean Kutzko, KX9X, took the microphone and made several QSOs on that pass while I pointed the antenna. Although I did have a tripod for the antenna, I was simply using the stock camera tripod mount and had no way to adjust polarity. Since polarity is so critical while operating satellites, the operators who pointed the antenna while using my Arrow generally took the antenna off the tripod and held it in their hand for quick polarity adjustments. K8YSE's speaker stand mount demonstrated a good way to mount an Arrow antenna on a tripod while retaining adequate control over polarity.

The next pass after this was a low western pass of XW-2C where I made several QSOs. At 9:37am, we operated a pass of A0-85 and made QSOs from coast-to-coast. A video of AMSAT VP of Operations Drew Glasbrenner, K04MA, at the microphone is available at:

<https://www.youtube.com/watch?v=xrmzym39X5E>

I would note that we were using a pair of FT-817s, barefoot, on that pass and were able to make several QSOs with just 5 watts, mostly full

quieting. Though A0-85 can often take a bit more power to get in to, QSOs using 5 watts and an Arrow antenna are very possible.

Passes of S0-50, A0-73, and F0-29 rounded out the demos for the Hamvention and we were QRT at 12:12pm on Sunday, but not before working MI6GTY in Northern Ireland on F0-29. It was nice to get Europe in the log from the Dayton Hamvention demo station and it was our last QSO of the 2016 Hamvention.

The AMSAT demo station has been a fun place to spend a majority of the last three Dayton Hamventions and I would encourage all satellite operators and those curious about satellite operation to visit the station outside of Ball Arena (near the ARRL and AMSAT booth areas) next May. Volunteers and guest operators are always sought!

A few pictures are posted on the AMSAT North America Facebook page: <https://www.facebook.com/groups/7828379515/permalink/10154235785829516/> (The AMSAT North America Facebook group is very active - in fact, traffic has likely surpassed the traffic on the AMSAT-BB. If you are not a member, I would encourage you to check it out <https://www.facebook.com/groups/7828379515/?qsefr=1>)

Thanks to the following for volunteering at the demo station (and apologies if I missed anyone):

Mark Hammond, N8MH
Drew Glasbrenner, K04MA
John Papay, K8YSE
Doug Papay, KD8CA0
Art Payne, VE3GNF
Wyatt Dirks, AC0RA
Michael Kirkhart, KD8QBA
John Brier, KG4AKV
Jeff Griffin, KB2M
Hope Lea, KM4IPF
Sean Kutzko, KX9X

Thanks to the following for providing equipment for the demo station:

Mike Young, WB8CX0 (Batteries)
Keith Pugh, W5IU (DC power distribution)
Washington, DC

P. S. I did not keep logs at the demo station, though I will remember if I worked you! If you need a card or LoTW upload for EM79, please let me know.
-Paul, N8HM

[ANS thanks to AMSAT-NA Secretary, Paul Stoetzer, N8HM and his team for the above information]

A Tiny Satellite of Your Very Own

They're not just for rocket scientists anymore

Satellites used to be the exclusive playthings of rich governments and wealthy corporations. But increasingly, as space becomes more democratized, these

sophisticated technologies are coming within reach of ordinary people. Just like drones before them, miniature satellites are beginning to fundamentally transform our conceptions of who gets to do what up above our heads.

As a recent report from the National Academy of Sciences highlights, these satellites hold tremendous potential for making satellite-based science more accessible than ever before. However, as the cost of getting your own satellite in orbit plummets, the risks of irresponsible use grow.

The question here is no longer “Can we?” but “Should we?” What are the potential downsides of having a slice of space densely populated by equipment built by people not traditionally labeled as “professionals”? And what would the responsible and beneficial development and use of this technology actually look like?

Some of the answers may come from a nonprofit organization that has been building and launching amateur satellites for nearly 50 years. Just a few inches across and ready for orbit.

The technology we’re talking about

Having your own personal satellite launched into orbit might sound like an idea straight out of science fiction. But over the past few decades a unique class of satellites has been created that fits the bill: CubeSats.

The “Cube” here simply refers to the satellite’s shape. The most common CubeSat (the so-called “1U” satellite) is a 10 cm (roughly 4 inches) cube, so small that a single CubeSat could easily be mistaken for a paperweight on your desk. These mini, modular satellites can fit in a launch vehicle’s formerly “wasted space.” Multiples can be deployed in combination for more complex missions than could be achieved by one CubeSat alone.

Within their compact bodies these minute satellites are able to house sensors and communications receivers/transmitters that enable operators to study the Earth from space, as well as space around the Earth.

They’re primarily designed for Low Earth Orbit (LEO) – an easily accessible region of space from around 200 to 800 miles above the Earth, where human-tended missions like the Hubble Space Telescope and the International Space Station (ISS) hang out. But they can attain more distant orbits; NASA plans for most of its future Earth-escaping payloads (to the moon and Mars especially) to carry CubeSats.

Because they’re so small and light, it costs much less to get a CubeSat into Earth orbit than a traditional communication or GPS satellite. For instance, a research group here at Arizona State University recently claimed their developmental “femtosats” (especially small CubeSats) could cost as little as US\$3,000 to put in orbit. This decrease in cost is allowing researchers, hobbyists and even elementary school groups to put simple instruments into LEO, by piggybacking onto rocket launches, or even having them deployed from the ISS.

The first CubeSat was created in the early 2000s, as a way of enabling

CalPoly

and Stanford graduate students to design, build, test and operate a spacecraft with similar capabilities to the USSR's Sputnik.

Since then, NASA, the National Reconnaissance Office and even Boeing have all launched and operated CubeSats. There are more than 130 currently operational in orbit. The NASA Educational Launch of Nano Satellite (ELaNa) program, which offers free launches for educational groups and science missions, is now open to U.S. nonprofit corporations as well.

Clearly, satellites are not just for rocket scientists anymore.

Thinking inside the box

The National Academy of Sciences report emphasizes CubeSats' importance in scientific discovery and the training of future space scientists and engineers.

Yet it also acknowledges that widespread deployment of LEO CubeSats isn't risk-free.

The greatest concern the authors raise is space debris – pieces of “junk” that orbit the earth, with the potential to cause serious damage if they collide with operational units, including the ISS.

Currently, there aren't many CubeSats and they're tracked closely. Yet as LEO opens up to more amateur satellites, they may pose an increasing threat. As the report authors point out, even near-misses might lead to the “creation of an onerous regulatory framework and affect the future disposition of science CubeSats.”

More broadly, the report authors focus on factors that might impede greater use of CubeSat technologies. These include regulations around earth-space radio communications, possible impacts of International Traffic in Arms Regulations (which govern import and export of defense-related articles and services in the U.S.), and potential issues around extra-terrestrial contamination.

But what about the rest of us? How can we be sure that hobbyists and others aren't launching their own “spy” satellites, or (intentionally or not) placing polluting technologies into LEO, or even deploying low-cost CubeSat networks that could be hijacked and used nefariously?

As CubeSat researchers are quick to point out, these are far-fetched scenarios. But they suggest that now's the time to ponder unexpected and unintended possible consequences of more people than ever having access to their own small slice of space. In an era when you can simply buy a CubeSat kit off the shelf, how can we trust the satellites over our heads were developed with good intentions by people who knew what they were doing?

Some “expert amateurs” in the satellite game could provide some inspiration for how to proceed responsibly.

Guidance from experienced amateurs

In 1969, the Radio Amateur Satellite Corporation (AMSAT) was created in order to foster ham radio enthusiasts' participation in space research and communication. It continued the efforts, begun in 1961, by Project OSCAR – a U.S.-based group that built and launched the very first nongovernmental satellite just four years after Sputnik.

As an organization of volunteers, AMSAT was putting “amateur” satellites in orbit decades before the current CubeSat craze. And over time, its members have learned a thing or two about responsibility.

Here, open-source development has been a central principle. Within the organization, AMSAT has a philosophy of open sourcing everything – making technical data on all aspects of their satellites fully available to everyone in the organization, and when possible, the public. According to a member of the team responsible for FOX 1-A, AMSAT's first CubeSat:

This means that it would be incredibly difficult to sneak something by us ... there's no way to smuggle explosives or an energy emitter into an amateur satellite when everyone has access to the designs and implementation.

However, they're more cautious about sharing info with nonmembers, as the organization guards against others developing the ability to hijack and take control of their satellites.

This form of “self-governance” is possible within long-standing amateur organizations that, over time, are able to build a sense of responsibility to community members, as well as society more generally.

How does responsible development evolve?

But what happens when new players emerge, who don't have deep roots within the existing culture?

Hobbyist and student “new kids on the block” are gaining access to technologies without being part of a longstanding amateur establishment. They are still constrained by funders, launch providers and a tapestry of regulations – all of which rein in what CubeSat developers can and cannot do. But there is a danger they're ill-equipped to think through potential unintended consequences.

What these unintended consequences might be is admittedly far from clear. Certainly, CubeSat developers would argue it's hard to imagine these tiny satellites causing substantial physical harm. Yet we know innovators can be remarkably creative with taking technologies in unexpected directions. Think of something as seemingly benign as the cellphone – we have microfinance and text-based social networking at one end of the spectrum, improvised explosive devices at the other.

This is where a culture of social responsibility around CubeSats becomes important – not simply for ensuring that physical risks are minimized (and good practices are adhered to), but also to engage with a much larger

community in
anticipating and managing less obvious consequences of the technology.

This is not an easy task. Yet the evidence from AMSAT and other areas of technology development suggest that responsible amateur communities can and do emerge around novel technologies.

For instance, see the diy-bio community, where hobbyists work in advanced community biotech labs. Their growing community commitment to safety and responsibility is highlighting how amateurs can embrace responsibility in research and innovation. A similar commitment is seen within open-source software and hardware communities, such as the members of the Linux Foundation.

The challenge here, of course, is ensuring that what an amateur community considers to be responsible, actually is. Here's where there needs to be a much wider public conversation that extends beyond government agencies and scientific communities to include students, hobbyists, and anyone who may potentially stand to be affected by the use of CubeSat technology.

See the Houston Chronicle website for further readings:
<http://www.houstonchronicle.com/local/gray-matters/article/Your-own-personal-satellite-7947152.php?t=756e94597b438d9cbb>

[ANS thanks Elizabeth Garbee and Andrew Maynard from Arizona State University
for the above information

New VHF, UHF, uW Handbook Available for Download

Version 7.5 of the IARU Region 1 VHF Handbook is now available for download.

The key Amateur Satellite section is on pages 123-131. There are also chapters on Band Planning, Contests, Propagation Research, Operating Procedures. Page 116 defines which way to thread a helical beam antenna.

<http://www.iaru-r1.org/index.php/documents/Documents/VHF/Handbook-7.50.pdf/>

[ANS thanks Trevor, M5AKA for the above information]

Amateur Satellite Launch from India

Mineo Wakita JE9PEL reports on the Indian ISRO PSLV-C34 amateur radio satellite launch planned for June 10, 2016 at 0355 UT into a 500 km 98 degree inclination orbit.

Main Payload, Cartosat-2C, Earth Observing
PSLV-XL(C-34), Satish Dharwan Space Centre, Sriharikota, India

Satellite	Uplink	Downlink	Beacon	Mode
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BEESAT-4      .      435.950  435.950  4800bps GMSK,CW
BIROS         .      437.525      .      4800bps GMSK
LAPAN-A3      .      .          .      Non-Amateur
Max Valier    .      145.860  145.960  CW
Sathyabamasat .      145.980      .      2400bps BPSK
Swayam COEP   .      437.025  437.025  1200bps BPSK,CW
Venta-1       .      .          437.325  CW
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<http://www.ne.jp/asahi/hamradio/je9pel/be4lapan.htm>

Among the satellites being launched is Swayam-1 developed by students at the College of Engineering Pune (COEP). It will provide a text messaging facility using the COEPSAT protocol.

see

<http://amsatindia.org/coep-satellite-swayam-project/>

<http://www.coep.org.in/csat/track-swayam/>

UPDATE: Yono YD0NXX reports the Indonesian built LAPAN-A3 does not have an amateur radio payload.

[ANS thanks AMSAT-UK for the above information]

UWE-3 Status Report

On May 21, 2016 the CubeSat UWE-3 celebrated 2.5 years in space without any significant failures.

Batteries, EPS, OBC and ADCS are fine, nevertheless we were confronted with a minor problem with one of the radios UWE-3 autonomously recovered from. Since then UWE-3 is in a very stable condition again.

Some weeks ago we have re-initiated operations with UWE-3 on an interim basis. The goal is to test new magnetic control algorithms in space. Therefore we operate the satellite on the 436.395200 MHz frequency and perform data downloads from time to time. In the figure below the satellite's rotation rate ω is shown for one of the experiments. The goal was to establish a rotation about the satellite's X-axis at 10 deg/s while the Y/Z-axes should be at 0 deg/s. In general the desired rotation rate could be achieved but with major deviations from the setpoint. With the intention of optimizing the relevant control laws we will continue with these experiments within the next days and weeks.

During our experiments we received an outstanding support from the radio community from all over the world we are very thankful for. The received packets were instantaneous injected into our algorithms and delivered an important contribution to our research work. We would like to express our special thanks to DK3WN, PE0SAT, DL8MCO, EU1XX, ON4HF, Rainer, JA5BLZ, JA6PL, CU2JX, LU4EOU, JA1GDE, SP7THR, G7GQW, YC3BVG, JF1EUY, JE9PEL, JE1CVL, J01PTD, ZL4JL, EA7ADI, K4KDR, JA0CAW, JH4XSY, PA2EON, SM0TGU. THANK YOU!

Yours sincerely,

UWE-3 Team

UWE-3 was launched with FUNcube-1 on November 21, 2013. Latest UWE-3 news at http://www7.informatik.uni-wuerzburg.de/forschung/space_exploration/projects/uwe_3/uwe_3_news/

[ANS thanks AMSAT-UK for the above information]

Tomsk-TPU-120 CubeSat Video

The Russian space agency Roscosmos has released a video of the Tomsk-TPU-120 CubeSat commemorative transmission from the International Space Station.

The satellite was developed by students at the Tomsk Polytechnic University to test new space materials technology and is the world's first space vehicle with a 3D-printed structure. It was launched from Baikonur to the ISS on March 31, 2016 in a Progress-MS-2 cargo vessel. It will be deployed by hand during a future Russian spacewalk (EVA), which is why unlike other CubeSats this one has a handle. The call sign of the satellite is RS4S.

Tomsk-TPU-120 CubeSat Callsign RS4S In May 2016 the Tomsk Polytechnic University celebrated its 120th anniversary. As part of the celebrations on May 10/11 the Tomsk-TPU-120 was activated in the ISS and transmitted a greeting to Earth inhabitants, recorded by students of the university in 10 languages: Russian, English, German, French, Chinese, Arabic, Tatar, Indian, Kazakh and Portuguese.

The greeting message was transmitted once a minute on 437.025 MHz FM. One of the Kenwood transceivers on the ISS provided a cross-band relay, re-transmitting the signal on 145.800 MHz FM.

The video, recorded in the Russian ISS Service Module, shows the CubeSat and the amateur radio station. The video is in Russian.

Watch
<https://www.youtube.com/watch?v=WnYIjgGU4vQ>

The next Russian spacewalk appears to be EVA-43 which is expected to take place in early 2017
<http://spaceflight101.com/iss/iss-calendar/>

World's First 3D-printed Satellite
<http://tpu.ru/en/news-events/760/>

Dmitry R4UAB operates a WebSDR which you can use to receive the transmissions when the ISS is over Russia
<http://websdr.r4uab.ru/>

[ANS thanks AMSAT-UK for the above information]

Es'Hail-2 Geostationary P4-A Transponder Frequencies

The launch of the Es'Hail-2 satellite into a geostationary orbit at 25.5 degrees East is planned for December 2016. The coverage area of the amateur radio Narrowband (NB) and Wideband (WB) transponders should extend from Brazil to Thailand.

Es'hail 2 will carry two "Phase 4" amateur radio non-inverting transponders operating in the 2400 MHz and 10450 MHz bands. A 250 kHz bandwidth linear transponder intended for conventional analogue operations and an 8 MHz bandwidth transponder for experimental digital modulation schemes and DVB amateur television.

Narrowband Linear transponder

2400.050 - 2400.300 MHz Uplink
10489.550 - 10489.800 MHz Downlink

Wideband digital transponder

2401.500 - 2409.500 MHz Uplink
10491.000 - 10499.000 MHz Downlink

Equipment requirements:

X-Band 10 GHz Downlink:

- 89 cm dishes in rainy areas at EOC like Brazil or Thailand
- 60 cm around coverage peak
- 75 cm dishes at peak -2dB
- NB: linear vertical polarisation
- WB: linear horizontal polarisation

S-Band 2.4 GHz NB-Uplink:

- narrow band modes like SSB, CW
- 5W nominal Uplink power (22.5 dBi antenna gain, 75cm dish)
- RHCP polarisation

S-Band 2.4 GHz WB-Uplink (DATV):

- wide band modes, DVB-S2
- peak EIRP of 53 dBW (2.4m dish and 100W) required
- RHCP polarisation

Presentation on Es'hail by Peter Guelzow DB20S, President of AMSAT-DL,
at the
2013 AMSAT-UK Colloquium
<http://www.batc.tv/streams/amsat1306>

[ANS thanks AMSAT-UK and AMSAT-DL for the above information]

ÑUSAT-1 SSB/CW Transponder Satellite

The launch of ÑUSAT-1, the second AMSAT ARGENTINA amateur satellite on May 30, will mark an extraordinary event for our Institution and fostering of hope for satellite community.

As we quoted when the announcement of the launching of this experiment, Amsat Argentina has been working for several years to keep alive the dream of many Argentine amateurs to get back into Space with their own satellite as a follow-on of the legendary 1990's LUSAT-1, reaping the benefits of Technological advancement of our days.

We believe technical activities and developments of experiments in near space share the same goals: preserving the human group, enhancing their capabilities as well as disseminate and guiding the education and development of the activity, meanwhile contributing to Space available resources.

Our agreement with Satellogic Enterprises, which already launched three low orbit satellites: Captain Beto, Manolito y Tita, two of which transmit telemetry and data currently in UHF identifying themselves with callsign LU7AA, allowed us to ride a linear analog amateur radio transponder and corresponding antenna aboard one of their next satellite, ÑUSAT-1

AMSAT-LU provides simultaneously, support for this mission and the ÑUSAT-2 mission, by operating one of the control stations at Tortuguitas, Prov. Of Bs.As.

The experiment Amsat-LU developed, evolved from original design of our colleague and partner William, PE1RAH, while electronic adaptation, mechanical and software was made by the LU Satellite Experiment group, mounted on a 10 x 10 centimeters radiating plate, in which components of the power supply as well as a duplexer and dual band antenna where also incorporated.

This set was installed on the Ñusat-1 bus, which supplies power and becomes part of several other experiments this satellite will make.

The transponder receives UHF which is broadcasted in VHF, has a bandwidth of 30 kHz. with an output power of 250 mW.

435.935 ~ 435.965 are LSB/CW uplink passband
145.965 ~ 145.935 are USB/CW downlink passband
145.900 Basic CW Telemetry

The launch will be from a Chinese launcher in a polar orbit at 500 km. height, with inclination of 97 degrees from Equator.

see
<http://www.amsat.org.ar>
<https://www.facebook.com/Amsat.LU>
<http://lusex.org.ar>
<http://amsat.org.ar/pass.htm>

[ANS thanks AMSAT-UK and AMSAT-Argentia for the above information]

ESA Announces Winning Radio Amateurs

On April 21, 2016, ESA's Education Office set a challenge for the worldwide radio amateur community to start listening out for three new orbiting CubeSats.

The results have now been released.

ESA's Education Office published the transmission frequencies of the student-built satellites that were about to be launched as part of the Fly Your Satellite! Program, and invited the radio amateur community to listen out for them.

The first three radio amateurs to send a recorded signal from AAUSAT4, e-st(a)r-II or OUFTI-1 would receive a prize from ESA's Education Office. Hundreds of radio amateurs from around the world joined in the friendly competition.

The CubeSats started sending signals after their release from the Soyuz VS-14 rocket and the triggering of their automatic activation sequence. Participants from Russia, USA, Poland, France, Belgium, Netherlands, Brazil, Italy, Denmark, and more tuned their receivers and listened.

Thanks to skill and patience on the ground, the winners come from Russia, the United States of America, Germany, and the Netherlands.

Contact with the first CubeSat came at 00:53:51 UT on April 26, 2016, within an hour of its separation from the launcher. Dmitri Paschkow R4UAB, Russia, heard the signal from OUFTI-1 using two receiving stations, in Kemerovo and Ruzaevka. Upon hearing OUFTI-1, he communicated the news immediately. "I understand that the students are worried [to hear from their satellite] and decided to please them!" says Paschkow.

Just over an hour after the first signal from OUFTI-1 was recorded, the next CubeSat checked in.

AAUSAT-4 was heard over California, US, by Justin Foley KI6EPH of California Polytechnic State University. He had a personal interest in the mission because some of his colleagues had developed the P-POD deployer that was used to eject the CubeSats into orbit.

He was ready at the receiver from the moment of deployment but heard nothing on that first pass, probably because the activation sequence had not yet completed. The signal came through on the second pass, arriving at 02:02 UT.

"It was extremely exciting to see signals from the newly launched satellite, and witness the beginning of a space mission", says Foley.

Then the wait began for e-st(a)r-II. At 05:40:58 UT, something dimly lit the screen of Mike Rupprecht DK3WN in Germany. But something was not quite right.

It certainly looked like a signal from the last remaining CubeSat, but why was the message so faint? It galvanized the amateur radio community to look harder.

Jan van Gils PE0SAT had to wait until May 2 at 16:38:05 UT to receive a signal from e-st(a)r-II that was strong enough to be decoded. Why e-st(a)r-II was only transmitting weak signals is under investigation, but the most important news is that all three CubeSats are functioning and transmitting, and their signals can be decoded.

A special mention goes to a young radio amateur who scored a personal best. Twelve year-old space enthusiast Matteo Micheletti from Belgium caught the OUFIT-1 signal with a portable log periodic antenna and a portable receiver. His triumph occurred on May 1, 2016 between 17:34 and 17:39 UT.

To mark their success, the radio amateur winners will each receive a Fly Your Satellite! Poster, a goodie bag and a scale 1:1 3D printed model of a CubeSat from ESA's Education Office.

Read the full ESA story at http://www.esa.int/Education/CubeSats_-_Fly_Your_Satellite/CubeSats_competition_winners

[ANS thanks AMSAT-UK and ESA for the above information]

Symposium to Address Interference-free Satellite Services

Experts are planning to meet in Geneva, 13-14 June for a Symposium to address interference-free satellite services.

Geneva, 4 May 2016 - The ITU International Satellite Communication Symposium to be held in Geneva, 13-14 June, will explore measures to prevent and combat interference in satellite communications. International experts will examine the current situation and the latest technologies to detect, identify, locate and mitigate harmful interference, which may severely impact satellite services, including safety operations.

Discussions will also focus on International space law, protecting space science services, radio astronomy, global navigation satellite services, and cybersecurity as well as ensuring interference-free satellite broadcast services.

A special session will be dedicated to innovation in satellite systems, focusing on technical characteristics and benefits arising from new generations of non-geostationary satellite orbit (non-GSO) constellations and High Throughput Satellites (HTS).

What: ITU International Satellite Communication Symposium 2016

When: 13-14 June 2016

Where: ITU Tower Building, Popov Room

Why: To provide an overview of ongoing progress on regulations, technologies and measures to prevent and combat interference in satellite communications and to share experiences on the latest developments and

innovations.

Who: Experts from the satellite industry, operators, regulators and broadcasters from around the world.

For more information, please contact:

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see
http://www.itu.int/net/pressoffice/press_releases/2016/Advisory-06.aspx

[ANS thanks the ITU for the above information]

DCC Call for Papers

Technical papers are solicited for presentation at the 35th Annual ARRL/TAPR Digital Communications Conference, to be held September 16-18 in St Petersburg, Florida. Papers will also be published in the Conference Proceedings. Authors do not need to attend the conference to have their papers included in the Proceedings. The submission deadline is July 31, 2016.

The ARRL/TAPR Digital Communications Conference is an international forum for technically minded radio amateurs to meet and present new ideas and techniques. Paper/presentation topic areas include -- but are not limited to -- software defined radio (SDR), digital voice, digital satellite communication, digital signal processing (DSP), HF digital modes, adapting IEEE 802.11 systems for Amateur Radio, Global Positioning System (GPS), Automatic Position Reporting System (APRS), Linux in Amateur Radio, AX.25 updates and Internet operability with Amateur Radio networks.

Submit papers to via e-mail to [maty\(a\)arrl.org](mailto:maty(a)arrl.org)<[mailto:maty\(a\)arrl.org](mailto:maty(a)arrl.org)>, or via postal mail to: Maty Weinberg, KB1EIB, ARRL, 225 Main St, Newington, CT 06111. Papers will be published exactly as submitted, and authors will retain all rights. Please do not email zip files as these will be rejected by our servers.

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[ANS thanks the ARRL, TAPR, and Steve Ford, WB8IMY for the above information]

AMSAT Events

Information about AMSAT activities at other important events around the country. Examples of these events are radio club meetings where AMSAT Area Coordinators give presentations, demonstrations of working amateur satellites, and hamfests with an AMSAT presence (a table with AMSAT literature and merchandise, sometimes also with presentations, forums, and/or demonstrations).

*Saturday, 4 June 2016 – White Mountain Hamfest in Show Low AZ

*Friday, Saturday, & Sunday 10-12 June 2016 – Ham-Com in Irving, TX

*Saturday, 11 June 2016 – Prescott Hamfest in Prescott AZ

*Wednesday, 6 July 2016 – Chehalis Valley Amateur Radio Society meeting in Chehalis WA

*Saturday, 13 August 2016 – KL7KC Hamfest in Fairbanks AK

[ANS thanks AMSAT-NA for the above information]

ARISS News

Successful Contacts

Cradle of Aviation Museum and Education Center, Garden City, New York, telebridge via W6SRJ

The ISS callsign is presently scheduled to be NA1ISS

The scheduled astronaut is Jeff Williams KD5TVQ

Contact was successful: Mon 2016-05-23 12:57:05 UTC 43 deg

The ARISS contact with Jeff Williams by the students at Westbury Magnet Academy at the Cradle of Aviation Museum in Garden City, New York was successful. Jeff answered 19 questions before loss of signal. Dan Dalby did a great job of operating at W6SR. The telebridge contact with students at Cradle of Aviation Museum and Education Center, Garden City, New York, USA was successful Mon 2016-05-23 12:57:05 UTC 43 deg. Astronaut Jeff Williams KD5TVQ answered 19 questions for the students at Westbury Magnet Academy who were on site at the Museum.

A local news channel filed this report: Students Take Call from

Astronaut on ISS

see NBC New York

http://www.nbcnewyork.com/on-air/as-seen-on/Students-Take-Call-from-Astronaut-on-ISS_New-York-380581991.html?_osource=mobilesharebar

The Cradle of Aviation Museum and Education Center, located in Garden City, New York, opened in 2002. The mission of the museum is to inspire students with the spirit of discovery through the exploration of air and space technologies, and to encourage them to consider careers in science, technology, engineering and math. The museum is home to the Westbury Magnet

Academy at the Cradle of Aviation, the first magnet school to open on Long Island. The Museum and Academy offer two summer STEM enrichment programs for students entering the seventh and ninth grades. The ARISS event will be an invaluable tool to supplement classroom instruction and research.

Upcoming Contacts

* Venta School, Carp, ON, Canada, telebridge via IK1SLD
The ISS callsign is presently scheduled to be OR4ISS
The scheduled astronaut is Jeff Williams KD5TVQ
Contact is a go for: Mon 2016-05-30 19:01:25 UTC 32 deg

Venta Preparatory School is a small co-ed day and boarding school from Junior Kindergarten to Grade 10, located just outside of Ottawa in Carp, Ontario. We foster and continually enhance an environment where each student can grow and achieve their highest potential.

* Bouze Island Elementary and Junior High School, Homeji, Japan,
direct via 8N3B
The ISS callsign is presently scheduled to be NA1SS
The scheduled astronaut is Timothy Peake KG5BVI
Contact is a go for: Sat 2016-06-04 08:31:09 UTC 74 deg

Bouze Island is one of the Ieshima small Islands which are located in the Seto Inland sea of Hyogo Prefecture in Japan. There are about 1400 people on the island and are part of the marine products industry. They live with simplicity and are friendly. But the students of this Island have not had a chance for scientific experience as part of their school education because of their remote location. There are 140 persons in the elementary school and 100 persons in the junior high school.

Watch

<http://www.ariss.org/upcoming-contacts.html>
for information about upcoming contacts as they are scheduled.

[ANS thanks ARISS, Dave, AA4KN, and Charlie, AJ9N for the above information]

Satellite Shorts From All Over

St. Paul Island Satellite Ops Word Getting Around

The DXer pages are picking up on the news of satellite operation from CY9C St. Paul Island. This something of a blog and the May 23 update mentions AMSAT often:

<http://www.dxcoffee.com/eng/2016/cy9c-st-paul-island/>

[ANS thanks JoAnne, K9JKM for the above information]

GK4LOH Received Over 3467km on 144 MHz by Reflection off ISS

A reflection from the structure of the International Space Station enabled a 144.175 MHz signal from Tim GK4LOH in Cornwall to cross the Atlantic.

<https://www.youtube.com/watch?v=Vii8DmG3ftc>

The YouTube description reads: 02:40 UTC May 24th 2016 ISS Flypast.
Signal heard 2 minutes 45 into the recording and continues for over a minute.

The CW transmitted message was "GK4LOH GK4LOH T T T T T T T T T T"

As soon as ISS set in GN37 I stepped outside the shack and watched as the ISS fly right over here:-) Recorded by Frank V01HP using the remote receiver beacon V01FN.

GK4LOH Blog
<http://www.g4loh.com/>

The RSGB VHF Manager John Regnault G4SWX has received a Canadian station on 144 MHz which on investigation was also found to be by ISS reflection, see http://www.southgatearc.org/news/2014/july/uk_radio_ham_copies_canadian_144_mhz_signal.htm

[ANS thanks AMSAT-UK for the above information]

/EX

In addition to regular membership, AMSAT offers membership in the President's Club. Members of the President's Club, as sustaining donors to AMSAT Project Funds, will be eligible to receive additional benefits. Application forms are available from the AMSAT Office.

Primary and secondary school students are eligible for membership at one-half the standard yearly rate. Post-secondary school students enrolled in at least half time status shall be eligible for the student rate for a maximum of 6 post-secondary years in this status. Contact Martha at the AMSAT Office for additional student membership information.

73,
This week's ANS Editor,
Joe Spier, K6WAO
k6wao at amsat dot org